

## RB183-22

IRC: R507.5, TABLE R507.5(1), TABLE R507.5(2), TABLE R507.5(3), TABLE R507.5(4), TABLE R507.5(5), FIGURE R507.5

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### 2021 International Residential Code

**Revise as follows:**

**R507.5 Deck beams.** Maximum allowable spans for wood deck beams, as shown in Figure R507.5, shall be in accordance with Tables R507.5(1) through R507.5(4) and based on the joist span length and cantilever length as shown in Figure R507.5. Beam plies shall be fastened together with two rows of 10d (3-inch × 0.128-inch) nails minimum at 16 inches (406 mm) on center along each edge. Beams shall be permitted to cantilever at each end up to one-fourth of the actual beam span. Deck beams of other materials shall be permitted where designed in accordance with accepted engineering practices.

**TABLE R507.5(1) MAXIMUM DECK BEAM SPAN—40 PSF LIVE LOAD<sup>c</sup>**

	<u>JOIST SPAN</u>	-	<u>JOIST SPAN LENGTH &amp; JOIST CANTILEVER LENGTH<sup>a,i</sup>(feet &amp; feet)</u>								
	<u>6</u>	<u>6 &amp; 0</u>	<u>6 &amp; 1.5</u>	-	-	-	-	-	-	-	-
	<u>8</u>	-	<u>8 &amp; 0</u>	<u>8 &amp; 1</u>	<u>8 &amp; 2</u>	-	-	-	-	-	-
	<u>10</u>	-	-	<u>10 &amp; 0</u>	<u>10 &amp; 1</u>	<u>10 &amp; 2.5</u>	-	-	-	-	-
	<u>12</u>	-	-	-	<u>12 &amp; 0</u>	<u>12 &amp; 1</u>	<u>12 &amp; 2</u>	<u>12 &amp; 3</u>	-	-	-
	<u>14</u>	-	-	-	-	<u>14 &amp; 0</u>	<u>14 &amp; 1</u>	<u>14 &amp; 2</u>	<u>14 &amp; 3.5</u>	-	-
	<u>16</u>	-	-	-	-	-	<u>16 &amp; 0</u>	<u>16 &amp; 1</u>	<u>16 &amp; 2.5</u>	<u>16 &amp; 4</u>	-
	<u>18</u>	-	-	-	-	-	-	<u>18 &amp; 0</u>	<u>18 &amp; 1.5</u>	<u>18 &amp; 3</u>	<u>18 &amp; 4.5</u>
BEAM SPECIES <sup>d</sup>	BEAM SIZE <sup>e</sup>		<u>EFFECTIVE DECK JOIST SPAN LENGTH<sup>a,i</sup>(feet)</u>								
			<u>6</u>		<u>8</u>	<u>10</u>	-	<u>12</u>	<u>14</u>	<u>16</u>	<u>18</u>
			<u>MAXIMUM DECK BEAM SPAN LENGTH<sup>a,b,f</sup>(feet-inches)</u> <u>(feet-inches)<sup>a,b,f</sup></u>								
Southern pine	1 – 2 × 6	<u>4-10</u>	4-7	<u>4-3</u>	4-0	3-7	<u>3-5</u>	3-3	3-0	2-10	2-8
	1 – 2 × 8	<u>6-4</u>	5-11	<u>5-6</u>	5-1	4-7	<u>4-4</u>	4-2	3-10	3-7	3-5
	1 – 2 × 10	<u>7-6</u>	7-0	<u>6-6</u>	6-0	5-5	<u>5-2</u>	4-11	4-7	4-3	4-0
	1 – 2 × 12	<u>8-8</u>	8-3	<u>7-8</u>	7-1	6-4	<u>6-1</u>	5-10	5-5	5-0	4-9
	2 – 2 × 6	<u>7-4</u>	6-11	<u>6-5</u>	5-11	5-4	<u>5-1</u>	4-10	4-6	4-3	4-0
	2 – 2 × 8	<u>9-4</u>	8-9	<u>8-2</u>	7-7	6-9	<u>6-5</u>	6-2	5-9	5-4	5-0
	2 – 2 × 10	<u>11-0</u>	10-4	<u>9-8</u>	9-0	8-0	<u>7-8</u>	7-4	6-9	6-4	6-0
	2 – 2 × 12	<u>13-0</u>	12-2	<u>11-4</u>	10-7	9-5	<u>9-0</u>	8-7	8-0	7-5	7-0
	3 – 2 × 6	<u>9-0</u>	8-6	<u>7-11</u>	7-5	6-8	<u>6-4</u>	6-1	5-8	5-3	4-11
	3 – 2 × 8	<u>11-7</u>	10-11	<u>10-3</u>	9-6	8-6	<u>8-1</u>	7-9	7-2	6-8	6-4
	3 – 2 × 10	<u>13-11</u>	13-0	<u>12-1</u>	11-2	10-0	<u>9-7</u>	9-2	8-6	7-11	7-6
Douglas fir-larch <sup>g</sup> Hem-fir <sup>g</sup> Spruce-pine-fir	3 – 2 × 12	<u>16-3</u>	15-3	<u>14-3</u>	13-3	11-10	<u>11-3</u>	10-9	10-0	9-4	8-10
	1 – 2 × 6	<u>4-5</u>	4-1	<u>3-9</u>	3-6	3-0	<u>2-10</u>	2-8	2-5	2-3	2-1
	1 – 2 × 8	<u>5-11</u>	5-6	<u>5-1</u>	4-8	4-0	<u>3-9</u>	3-6	3-2	2-11	2-9
	1 – 2 × 10	<u>7-1</u>	6-8	<u>6-3</u>	5-10	5-1	<u>4-9</u>	4-6	4-1	3-9	3-6
	1 – 2 × 12	<u>8-3</u>	7-9	<u>7-3</u>	6-9	6-0	<u>5-9</u>	5-6	5-0	3-9	3-6
	2 – 2 × 6	<u>6-6</u>	6-1	<u>5-8</u>	5-3	4-9	<u>4-6</u>	4-4	3-11	3-7	3-3
	2 – 2 × 8	<u>8-8</u>	8-2	<u>7-7</u>	7-1	6-4	<u>6-0</u>	5-9	5-2	4-8	4-4
	2 – 2 × 10	<u>10-8</u>	10-0	<u>9-3</u>	8-7	7-9	<u>7-4</u>	7-0	6-6	6-0	5-6
	2 – 2 × 12	<u>12-4</u>	11-7	<u>10-9</u>	10-0	8-11	<u>8-6</u>	8-2	7-7	7-1	6-8
	3 – 2 × 6	<u>8-2</u>	7-8	<u>7-2</u>	6-8	6-0	<u>5-9</u>	5-6	5-1	4-9	4-6
	3 – 2 × 8	<u>10-11</u>	10-3	<u>9-6</u>	8-10	7-11	<u>7-7</u>	7-3	6-8	6-3	5-11
	3 – 2 × 10	<u>13-4</u>	12-6	<u>11-8</u>	10-10	9-8	<u>9-3</u>	8-10	8-2	7-8	7-2
	3 – 2 × 12	<u>15-6</u>	14-6	<u>13-6</u>	12-7	11-3	<u>10-9</u>	10-3	9-6	8-11	8-5
	1 – 2 × 6	<u>4-5</u>	4-2	<u>3-10</u>	3-7	3-1	<u>2-11</u>	2-9	2-6	2-3	2-2
	1 – 2 × 8	<u>5-8</u>	5-4	<u>4-11</u>	4-7	4-1	<u>3-10</u>	3-7	3-3	3-0	2-10
	1 – 2 × 10	<u>6-11</u>	6-6	<u>6-0</u>	5-7	5-0	<u>4-9</u>	4-7	4-2	3-10	3-7
	1 – 2 × 12	<u>8-0</u>	7-6	<u>7-0</u>	6-6	5-10	<u>5-7</u>	5-4	4-11	4-7	4-4
	2 – 2 × 6	<u>6-7</u>	6-2	<u>5-9</u>	5-4	4-10	<u>4-7</u>	4-5	4-0	3-8	3-4
	2 – 2 × 8	<u>8-4</u>	7-10	<u>7-4</u>	6-10	6-1	<u>5-10</u>	5-7	5-2	4-10	4-5
	2 – 2 × 10	<u>12-2</u>	9-7	<u>8-11</u>	8-4	7-5	<u>7-1</u>	6-9	6-3	5-10	5-6
	2 – 2 × 12	<u>11-9</u>	11-1	<u>10-4</u>	9-8	8-7	<u>8-2</u>	7-10	7-3	6-10	6-5
	3 – 2 × 6	<u>8-1</u>	7-8	<u>7-2</u>	6-9	6-0	<u>5-9</u>	5-6	5-1	4-9	4-6
	3 – 2 × 8	<u>10-6</u>	9-10	<u>9-2</u>	8-6	7-7	<u>7-3</u>	6-11	6-5	6-0	5-8

	<u>JOIST SPAN</u>	-	<u>JOIST SPAN LENGTH &amp; JOIST CANTILEVER LENGTH (feet &amp; feet)</u>								
Redwood <sup>h</sup>	<u>6</u>	<u>6 &amp; 0</u>	<u>6 &amp; 1.5</u>	-	-	-	-	-	-	-	-
Western cedars <sup>h</sup>	<u>8</u>	-	<u>8 &amp; 0</u>	<u>8 &amp; 1</u>	<u>8 &amp; 2</u>	-	-	-	-	-	-
Ponderosa pine <sup>h</sup>	<u>10</u>	-	-	<u>10 &amp; 0</u>	<u>10 &amp; 1</u>	<u>10 &amp; 2.5</u>	-	-	-	-	-
Red pine <sup>h</sup>	<u>12</u>	-	-	-	<u>12 &amp; 0</u>	<u>12 &amp; 1</u>	<u>12 &amp; 2</u>	<u>12 &amp; 3</u>	-	-	-
	<u>14</u>	-	-	-	-	<u>14 &amp; 0</u>	<u>14 &amp; 1</u>	<u>14 &amp; 2</u>	<u>14 &amp; 3.5</u>	-	-
	<u>16</u>	-	-	-	-	-	<u>16 &amp; 0</u>	<u>16 &amp; 1</u>	<u>16 &amp; 2.5</u>	<u>16 &amp; 4</u>	-
	<u>18</u>	-	-	-	-	-	-	<u>18 &amp; 0</u>	<u>18 &amp; 1.5</u>	<u>18 &amp; 3</u>	<u>18 &amp; 4.5</u>
BEAM SPECIES	BEAM SIZE		<u>EFFECTIVE DECK JOIST SPAN LENGTH (feet)</u>								
			<u>6</u>		<u>8</u>	<u>10</u>	-	<u>12</u>	<u>14</u>	<u>16</u>	<u>18</u>
			<u>MAXIMUM DECK BEAM SPAN LENGTH (feet-inches)</u>								
	3 – 2 × 10	<u>12-9</u>	12-0	<u>11-2</u>	10-5	9-4	<u>8-11</u>	8-6	7-10	7-4	6-11
	3 – 2 × 12	<u>14-10</u>	13-11	<u>13-0</u>	12-1	10-9	<u>10-3</u>	9-10	9-1	8-6	8-1

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

- Interpolation permitted for conditions with zero joist cantilever length. Extrapolation not permitted.
- Beams supporting a single span of joists with or without cantilever.
- Dead load = 10 psf,  $L/\Delta = 360$  at main span,  $L/\Delta = 180$  at cantilever. Snow load is not assumed to be concurrent with live load.
- Beams supporting deck joists from one side only.
- No. 2 grade, wet service factor included.
- Beam depth shall be equal to or greater than the depth of intersecting joist for a flush beam connection.
- Beam cantilevers are limited to the adjacent beam's span divided by 4.
- Includes incising factor.
- Incising factor not included.
- Deck joist span as shown in Figure R507.5.
- ~~For calculation of effective deck joist span, the actual joist span length shall be multiplied by the joist span factor in accordance with Table R507.5(5).~~

**TABLE R507.5(2) MAXIMUM DECK BEAM SPAN—50 PSF GROUND SNOW LOAD<sup>c</sup>**

	JOIST SPAN	JOIST SPAN LENGTH & JOIST CANTILEVER LENGTH <sup>a,i</sup> (feet & feet)									
	<u>6</u>	<u>6 &amp; 0</u>	<u>6 &amp; 1.5</u>								
	<u>8</u>		<u>8 &amp; 0</u>	<u>8 &amp; 1</u>	<u>8 &amp; 2</u>						
	<u>10</u>			<u>10 &amp; 0</u>	<u>10 &amp; 1</u>	<u>10 &amp; 2.5</u>					
	<u>12</u>				<u>12 &amp; 0</u>	<u>12 &amp; 1</u>	<u>12 &amp; 2</u>	<u>12 &amp; 3</u>			
	<u>14</u>					<u>14 &amp; 0</u>	<u>14 &amp; 1</u>	<u>14 &amp; 2</u>	<u>14 &amp; 3.5</u>		
	<u>16</u>						<u>16 &amp; 0</u>	<u>16 &amp; 1</u>	<u>16 &amp; 2.5</u>		
	<u>18</u>							<u>18 &amp; 0</u>	<u>18 &amp; 1.5</u>	<u>18 &amp; 3</u>	<u>18 &amp; 4.5</u>
BEAM SPECIES <sup>d</sup>	BEAM SIZE <sup>e</sup>		EFFECTIVE DECK JOIST SPAN LENGTH (feet) <sup>a,i,j</sup>								
			6		8	10		12	14	16	18
			MAXIMUM DECK BEAM SPAN LENGTH <sup>a,b,f</sup> (feet-inches) (feet-inches) <sup>a,b,f</sup>								
Southern pine	1 – 2 × 6	<u>4-9</u>	4-6	<u>4-2</u>	3-11	3-6	<u>3-4</u>	3-2	2-11	2-9	2-7
	1 – 2 × 8	<u>6-2</u>	5-9	<u>5-4</u>	4-11	4-5	<u>4-2</u>	4-0	3-9	3-6	3-3
	1 – 2 × 10	<u>7-2</u>	6-9	<u>6-3</u>	5-10	5-3	<u>5-0</u>	4-9	4-5	4-2	3-11
	1 – 2 × 12	<u>8-6</u>	8-0	<u>7-5</u>	6-11	6-2	<u>5-11</u>	5-8	5-3	4-11	4-7
	2 – 2 × 6	<u>7-1</u>	6-8	<u>6-2</u>	5-9	5-2	<u>4-11</u>	4-9	4-4	4-1	3-10
	2 – 2 × 8	<u>9-1</u>	8-6	<u>7-11</u>	7-4	6-7	<u>6-3</u>	6-0	5-7	5-2	4-11
	2 – 2 × 10	<u>10-9</u>	10-1	<u>9-5</u>	8-9	7-10	<u>7-5</u>	7-1	6-7	6-2	5-10
	2 – 2 × 12	<u>12-9</u>	11-11	<u>11-1</u>	10-3	9-2	<u>8-9</u>	8-5	7-9	7-3	6-10
	3 – 2 × 6	<u>8-3</u>	7-11	<u>7-6</u>	7-2	6-6	<u>6-2</u>	5-11	5-6	5-1	4-10
	3 – 2 × 8	<u>11-0</u>	10-5	<u>9-10</u>	9-3	8-3	<u>7-10</u>	7-6	6-11	6-6	6-2
	3 – 2 × 10	<u>13-6</u>	12-8	<u>11-9</u>	10-11	9-9	<u>8-4</u>	8-11	8-3	7-9	7-3
Douglas fir-larch <sup>g</sup> Hem-fir <sup>g</sup> Spruce-pine-fir <sup>g</sup>	3 – 2 × 12	<u>15-11</u>	14-11	<u>13-11</u>	12-11	11-6	<u>11-0</u>	10-6	9-9	9-1	8-7
	1 – 2 × 6	<u>4-3</u>	4-0	<u>3-8</u>	3-5	2-11	<u>2-9</u>	2-7	2-4	2-2	2-0
	1 – 2 × 8	<u>5-9</u>	5-4	<u>4-11</u>	4-7	3-11	<u>3-8</u>	3-5	3-1	2-10	2-8
	1 – 2 × 10	<u>7-0</u>	6-7	<u>6-1</u>	5-8	4-11	<u>4-8</u>	4-5	4-0	3-8	3-5
	1 – 2 × 12	<u>8-1</u>	7-7	<u>7-1</u>	6-7	5-11	<u>5-7</u>	5-4	4-10	4-6	4-2
	2 – 2 × 6	<u>6-5</u>	6-0	<u>5-7</u>	5-2	4-7	<u>4-4</u>	4-2	3-10	3-5	3-2
	2 – 2 × 8	<u>8-6</u>	8-0	<u>7-5</u>	6-11	6-2	<u>5-11</u>	5-8	5-0	4-7	4-2
	2 – 2 × 10	<u>10-5</u>	9-9	<u>9-1</u>	8-5	7-7	<u>7-3</u>	6-11	6-4	5-10	5-4
	2 – 2 × 12	<u>12-1</u>	11-4	<u>10-7</u>	9-10	8-9	<u>8-4</u>	8-0	7-5	6-11	6-6
	3 – 2 × 6	<u>8-0</u>	7-6	<u>7-0</u>	6-6	5-9	<u>5-6</u>	5-3	4-11	4-7	4-4
	3 – 2 × 8	<u>10-8</u>	10-0	<u>9-4</u>	8-8	7-9	<u>7-5</u>	7-1	6-6	6-1	5-8
Redwood <sup>h</sup> Western cedars <sup>h</sup> Ponderosa pine <sup>h</sup> Red pine <sup>h</sup>	3 – 2 × 10	<u>13-1</u>	12-3	<u>11-5</u>	10-7	9-6	<u>9-1</u>	8-8	8-0	7-6	7-0
	3 – 2 × 12	<u>15-2</u>	14-3	<u>13-3</u>	12-4	11-0	<u>10-6</u>	10-1	9-4	8-9	8-3
	1 – 2 × 6	<u>4-4</u>	4-1	<u>3-9</u>	3-6	3-0	<u>2-10</u>	2-8	2-5	2-3	2-1
	1 – 2 × 8	<u>5-6</u>	5-2	<u>4-10</u>	4-6	4-0	<u>3-9</u>	3-6	3-2	2-11	2-9
	1 – 2 × 10	<u>6-9</u>	6-4	<u>5-11</u>	5-6	4-11	<u>4-8</u>	4-6	4-1	3-9	3-6
	1 – 2 × 12	<u>7-10</u>	7-4	<u>6-10</u>	6-4	5-8	<u>5-5</u>	5-2	4-10	4-6	4-3
	2 – 2 × 6	<u>6-6</u>	6-1	<u>5-8</u>	5-3	4-8	<u>4-6</u>	4-4	3-11	3-6	3-3
	2 – 2 × 8	<u>8-2</u>	7-8	<u>7-2</u>	6-8	5-11	<u>5-8</u>	5-5	5-0	4-8	4-3
	2 – 2 × 10	<u>10-0</u>	9-5	<u>8-9</u>	8-2	7-3	<u>6-11</u>	6-8	6-2	5-9	5-5
	2 – 2 × 12	<u>11-8</u>	10-11	<u>10-2</u>	9-5	8-5	<u>8-0</u>	7-8	7-2	6-8	6-3
	3 – 2 × 6	<u>7-5</u>	7-1	<u>6-9</u>	6-5	5-11	<u>5-8</u>	5-5	5-0	4-8	4-5

3 – 2 × 8	<u>9-10</u>	9-4	<u>8-10</u>	8-4	7-5	<u>7-1</u>	6-10	604	5-11	5-7
3 – 2 × 10	<u>12-6</u>	11-9	<u>10-11</u>	10-2	9-1	<u>8-8</u>	8-4	7-8	7-2	6-9
3 – 2 × 12	<u>14-7</u>	13-8	<u>12-9</u>	11-10	10-7	<u>10-1</u>	9-8	8-11	8-4	7-10

For SI: 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

- a. Interpolation ~~allowed~~ permitted for conditions with zero joist cantilever length. Extrapolation not permitted. ~~is not allowed~~.
- b. Beams supporting a single span of joists with or without cantilever.
- c. Dead load = 10 psf,  $L/\Delta = 360$  at main span,  $L/\Delta = 180$  at cantilever. Snow load not assumed to be concurrent with live load.
- d. No. 2 grade, wet service factor included.
- e. Beam depth shall be equal to or greater than the depth of intersecting joist for a flush beam connection.
- f. Beam cantilevers are limited to the adjacent beam's span divided by 4.
- g. Includes incising factor.
- h. Incising factor not included.
- i. Deck joist span as shown in Figure R507.5.
- j. ~~For calculation of effective deck joist span, the actual joist span length shall be multiplied by the joist span factor in accordance with Table R507.5(5).~~

**TABLE R507.5(3) MAXIMUM DECK BEAM SPAN—60 PSF GROUND SNOW LOAD<sup>c</sup>**

	JOIST SPAN	JOIST SPAN LENGTH & JOIST CANTILEVER LENGTH <sup>a,1</sup> (feet & feet)									
	<u>6</u>	<u>6 &amp; 0</u>	<u>6 &amp; 1.5</u>								
	<u>8</u>		<u>8 &amp; 0</u>	<u>8 &amp; 1</u>	<u>8 &amp; 2</u>						
	<u>10</u>			<u>10 &amp; 0</u>	<u>10 &amp; 1</u>	<u>10 &amp; 2.5</u>					
	<u>12</u>				<u>12 &amp; 0</u>	<u>12 &amp; 1</u>	<u>12 &amp; 2</u>	<u>12 &amp; 3</u>			
	<u>14</u>					<u>14 &amp; 0</u>	<u>14 &amp; 1</u>	<u>14 &amp; 2</u>	<u>14 &amp; 3.5</u>		
	<u>16</u>						<u>16 &amp; 0</u>	<u>16 &amp; 1</u>	<u>16 &amp; 2.5</u>	<u>16 &amp; 4</u>	
	<u>18</u>							<u>18 &amp; 0</u>	<u>18 &amp; 1.5</u>	<u>18 &amp; 3</u>	<u>18 &amp; 4.5</u>
BEAM SPECIES <sup>d</sup>	BEAM SIZE <sup>e</sup>		EFFECTIVE DECK JOIST SPAN LENGTH <sup>a,1,f</sup> (feet)								
			6		8	10		12	14	16	18
			MAXIMUM DECK BEAM SPAN LENGTH <sup>a,b,f</sup> (feet-inches)								
Southern pine	1 – 2 × 6	<u>4-5</u>	4-2	<u>3-10</u>	3-7	3-3	<u>3-1</u>	2-11	2-9	2-6	2-5
	1 – 2 × 8	<u>5-7</u>	5-3	<u>4-11</u>	4-7	4-1	<u>3-11</u>	3-9	3-5	3-3	3-0
	1 – 2 × 10	<u>6-8</u>	6-3	<u>5-10</u>	5-5	4-10	<u>4-7</u>	4-5	4-1	3-10	3-7
	1 – 2 × 12	<u>7-11</u>	7-5	<u>6-11</u>	6-5	5-9	<u>5-6</u>	5-3	4-10	4-6	4-3
	2 – 2 × 6	<u>6-7</u>	6-2	<u>5-9</u>	5-4	4-9	<u>4-6</u>	4-4	4-0	3-9	3-7
	2 – 2 × 8	<u>8-4</u>	7-10	<u>7-4</u>	6-10	6-1	<u>5-10</u>	5-7	5-2	4-10	4-6
	2 – 2 × 10	<u>9-10</u>	9-4	<u>8-8</u>	8-1	7-3	<u>6-11</u>	6-7	6-1	5-8	5-4
	2 – 2 × 12	<u>11-9</u>	11-0	<u>10-3</u>	9-6	8-6	<u>8-1</u>	7-9	7-2	6-9	6-4
	3 – 2 × 6	<u>7-9</u>	7-5	<u>7-1</u>	6-9	6-0	<u>5-9</u>	5-6	5-1	4-9	4-6
	3 – 2 × 8	<u>10-4</u>	9-9	<u>9-1</u>	8-6	7-8	<u>7-3</u>	6-11	6-5	6-0	5-8
	3 – 2 × 10	<u>12-5</u>	11-8	<u>10-11</u>	10-2	9-1	<u>8-8</u>	8-3	7-8	7-2	6-9
	3 – 2 × 12	<u>14-8</u>	13-9	<u>12-10</u>	11-11	10-8	<u>10-2</u>	9-9	9-0	8-5	7-11
Douglas fir-larch <sup>g</sup> Hem-fir <sup>g</sup> Spuce-pine-fir <sup>g</sup>	1 – 2 × 6	<u>3-11</u>	3-8	<u>3-4</u>	3-1	2-8	<u>2-6</u>	2-4	2-2	2-0	1-10
	1 – 2 × 8	<u>5-5</u>	5-0	<u>4-6</u>	4-1	3-6	<u>3-3</u>	3-1	2-10	2-7	2-5
	1 – 2 × 10	<u>6-6</u>	6-1	<u>5-7</u>	5-2	4-6	<u>4-3</u>	4-0	3-7	3-4	3-2
	1 – 2 × 12	<u>7-7</u>	7-1	<u>6-7</u>	6-1	5-5	<u>5-1</u>	4-10	4-5	4-1	3-10
	2 – 2 × 6	<u>5-10</u>	5-6	<u>5-1</u>	4-9	4-3	<u>4-0</u>	3-10	3-5	3-1	2-10
	2 – 2 × 8	<u>7-11</u>	7-5	<u>6-11</u>	6-5	5-9	<u>5-4</u>	5-0	4-6	4-1	3-9
	2 – 2 × 10	<u>9-7</u>	9-0	<u>8-5</u>	7-10	7-0	<u>6-8</u>	6-4	5-9	5-2	4-10
	2 – 2 × 12	<u>11-2</u>	10-6	<u>9-9</u>	9-1	8-1	<u>7-9</u>	7-5	6-10	6-4	5-10
	3 – 2 × 6	<u>7-4</u>	6-11	<u>6-5</u>	6-0	5-4	<u>5-1</u>	4-11	4-6	4-2	3-10
	3 – 2 × 8	<u>9-10</u>	9-3	<u>8-7</u>	8-0	7-2	<u>6-10</u>	6-6	6-1	5-6	5-0
	3 – 2 × 10	<u>12-1</u>	11-4	<u>10-7</u>	9-10	8-9	<u>8-4</u>	8-0	7-5	6-11	6-5
	3 – 2 × 12	<u>13-6</u>	13-2	<u>11-9</u>	11-5	10-2	<u>9-9</u>	9-4	8-7	8-1	7-7
Redwood <sup>h</sup> Western cedars <sup>h</sup> Ponderosa pine <sup>h</sup> Red pine <sup>h</sup>	1 – 2 × 6	<u>4-0</u>	3-9	<u>3-5</u>	3-2	2-9	<u>2-7</u>	2-5	2-2	2-0	1-11
	1 – 2 × 8	<u>5-2</u>	4-10	<u>4-6</u>	4-2	3-7	<u>3-4</u>	3-2	2-11	2-8	2-6
	1 – 2 × 10	<u>6-2</u>	5-10	<u>5-5</u>	5-1	4-6	<u>4-3</u>	4-1	3-8	3-5	3-3
	1 – 2 × 12	<u>7-3</u>	6-10	<u>6-4</u>	5-11	5-3	<u>5-0</u>	4-10	4-5	4-2	3-11
	2 – 2 × 6	<u>5-11</u>	5-7	<u>5-2</u>	4-10	4-4	<u>4-1</u>	3-11	3-6	3-2	2-11
	2 – 2 × 8	<u>7-6</u>	7-1	<u>6-7</u>	6-2	5-6	<u>5-3</u>	5-0	4-7	4-2	3-10
	2 – 2 × 10	<u>9-3</u>	8-8	<u>8-1</u>	7-6	6-9	<u>6-5</u>	6-2	5-8	5-4	4-11
	2 – 2 × 12	<u>10-8</u>	10-1	<u>9-5</u>	8-9	7-10	<u>7-6</u>	7-2	6-7	6-2	5-10

3 – 2 × 6	<u>6-11</u>	6-8	<u>6-4</u>	6-1	5-5	<u>5-2</u>	5-0	4-7	4-3	3-11
3 – 2 × 8	<u>9-3</u>	8-9	<u>8-3</u>	7-9	6-11	<u>6-7</u>	6-4	5-10	5-5	5-3
3 – 2 × 10	<u>11-8</u>	10-11	<u>10-2</u>	9-5	8-5	<u>8-0</u>	7-8	7-3	6-8	6-3
3 – 2 × 12	<u>13-6</u>	12-8	<u>11-9</u>	10-11	9-9	<u>8-4</u>	8-11	8-3	7-9	7-3

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

- a. Interpolation ~~allowed~~ permitted for conditions with zero joist cantilever length. Extrapolation not permitted. ~~is not allowed~~.
- b. Beams supporting a single span of joists with or without cantilever.
- c. Dead load = 10 psf,  $L/\Delta = 360$  at main span,  $L/\Delta = 180$  at cantilever. Snow load not assumed to be concurrent with live load.
- d. No. 2 grade, wet service factor included.
- e. Beam depth shall be equal to or greater than the depth of intersecting joist for a flush beam connection.
- f. Beam cantilevers are limited to the adjacent beam's span divided by 4.
- g. Includes incising factor.
- h. Incising factor not included.
- i. Deck joist span as shown in Figure R507.5.
- j. ~~For calculation of effective deck joist span, the actual joist span length shall be multiplied by the joist span factor in accordance with Table R507.5(5).~~

**TABLE R507.5(4) MAXIMUM DECK BEAM SPAN—70 PSF GROUND SNOW LOAD<sup>c</sup>**

	JOIST SPAN	JOIST SPAN LENGTH & CANTILEVER LENGTH <sup>a,i</sup> (feet & feet)									
	<u>6</u>	<u>6 &amp; 0</u>	<u>6 &amp; 1.5</u>								
	<u>8</u>		<u>8 &amp; 0</u>	<u>8 &amp; 1</u>	<u>8 &amp; 2</u>						
	<u>10</u>			<u>10 &amp; 0</u>	<u>10 &amp; 1</u>	<u>10 &amp; 2.5</u>					
	<u>12</u>				<u>12 &amp; 0</u>	<u>12 &amp; 1</u>	<u>12 &amp; 2</u>	<u>12 &amp; 3</u>			
	<u>14</u>					<u>14 &amp; 0</u>	<u>14 &amp; 1</u>	<u>14 &amp; 2</u>	<u>14 &amp; 3.5</u>		
	<u>16</u>						<u>16 &amp; 0</u>	<u>16 &amp; 1</u>	<u>16 &amp; 2.5</u>	<u>16 &amp; 4</u>	
	<u>18</u>							<u>18 &amp; 0</u>	<u>18 &amp; 1</u>	<u>18 &amp; 3</u>	<u>18 &amp; 4.5</u>
BEAM SPECIES <sup>d</sup>	BEAM SIZE <sup>e</sup>		EFFECTIVE DECK JOIST SPAN LENGTH (feet) <sup>a,i,j</sup>								
			6		8	10		12	14	16	18
			MAXIMUM DECK BEAM SPAN LENGTH <sup>a,b,f</sup> (feet-inches) (feet-inches) <sup>a,b,f</sup>								
Southern pine	1 – 2 × 6	<u>4-2</u>	3-11	<u>3-7</u>	3-4	3-0	<u>2-10</u>	2-9	2-6	2-4	2-3
	1 – 2 × 8	<u>5-4</u>	4-11	<u>4-8</u>	4-3	3-10	<u>3-8</u>	3-6	3-3	3-0	2-10
	1 – 2 × 10	<u>6-2</u>	5-10	<u>5-5</u>	5-1	4-6	<u>4-4</u>	4-2	3-10	3-7	3-4
	1 – 2 × 12	<u>7-4</u>	6-11	<u>6-5</u>	6-0	5-4	<u>5-1</u>	4-11	4-6	4-3	4-0
	2 – 2 × 6	<u>6-3</u>	5-9	<u>5-4</u>	5-0	4-6	<u>4-3</u>	4-1	3-9	3-6	3-4
	2 – 2 × 8	<u>7-10</u>	7-4	<u>6-10</u>	6-4	5-8	<u>5-5</u>	5-2	4-10	4-6	4-3
	2 – 2 × 10	<u>9-6</u>	8-9	<u>8-2</u>	7-7	6-9	<u>6-5</u>	6-2	5-8	5-4	5-0
	2 – 2 × 12	<u>10-11</u>	10-3	<u>9-7</u>	8-11	8-0	<u>7-7</u>	7-3	6-9	6-3	5-11
	3 – 2 × 6	<u>7-4</u>	7-0	<u>6-7</u>	6-3	5-7	<u>5-4</u>	5-1	4-9	4-5	4-2
	3 – 2 × 8	<u>9-10</u>	9-3	<u>8-7</u>	8-0	7-2	<u>6-10</u>	6-6	6-0	5-8	5-4
	3 – 2 × 10	<u>11-7</u>	10-11	<u>10-2</u>	9-6	8-6	<u>8-1</u>	7-9	7-2	6-8	6-4
	3 – 2 × 12	<u>13-9</u>	12-11	<u>12-0</u>	11-2	10-0	<u>9-6</u>	9-1	8-5	7-11	7-5
Douglas fir-larch <sup>g</sup> Hem-fir <sup>g</sup> Spruce-pine-fir <sup>g</sup>	1 – 2 × 6	<u>3-8</u>	3-5	<u>3-1</u>	2-10	2-5	<u>2-3</u>	2-2	2-0	1-10	1-9
	1 – 2 × 8	<u>4-10</u>	4-7	<u>4-1</u>	3-8	3-2	<u>3-0</u>	2-10	2-7	2-5	2-4
	1 – 2 × 10	<u>6-1</u>	5-8	<u>5-2</u>	4-9	4-1	<u>3-10</u>	3-8	3-4	3-1	2-11
	1 – 2 × 12	<u>7-0</u>	6-7	<u>6-1</u>	5-8	5-0	<u>4-9</u>	4-6	4-1	3-10	3-7
	2 – 2 × 6	<u>5-6</u>	5-2	<u>4-10</u>	4-6	4-0	<u>3-8</u>	3-5	3-1	2-10	2-7
	2 – 2 × 8	<u>7-4</u>	6-11	<u>6-5</u>	6-0	5-3	<u>4-11</u>	4-7	4-1	3-8	3-5
	2 – 2 × 10	<u>8-11</u>	8-5	<u>7-10</u>	7-4	6-6	<u>6-2</u>	5-10	5-2	4-9	4-5
	2 – 2 × 12	<u>10-6</u>	9-10	<u>9-2</u>	8-6	7-7	<u>7-3</u>	6-11	6-4	5-9	5-4
	3 – 2 × 6	<u>6-11</u>	6-6	<u>6-0</u>	5-7	5-0	<u>4-9</u>	4-7	4-2	3-9	3-5
	3 – 2 × 8	<u>9-3</u>	8-8	<u>8-1</u>	7-6	6-8	<u>6-4</u>	6-1	5-6	5-0	4-7
	3 – 2 × 10	<u>11-3</u>	10-7	<u>9-10</u>	9-2	8-2	<u>7-10</u>	7-6	6-11	6-4	5-10
	3 – 2 × 12	<u>13-2</u>	12-4	<u>11-6</u>	10-8	9-7	<u>9-2</u>	8-9	8-1	7-7	7-1
Redwood <sup>h</sup> Western cedars <sup>h</sup> Ponderosa pine <sup>h</sup> Red pine <sup>h</sup>	1 – 2 × 6	<u>3-9</u>	3-6	<u>3-2</u>	2-11	2-6	<u>2-4</u>	2-3	2-0	1-11	1-9
	1 – 2 × 8	<u>4-10</u>	4-6	<u>4-2</u>	3-10	3-3	<u>3-1</u>	2-11	2-8	2-6	2-4
	1 – 2 × 10	<u>5-10</u>	5-6	<u>5-1</u>	4-9	4-2	<u>3-11</u>	3-9	3-5	3-2	3-0
	1 – 2 × 12	<u>6-9</u>	6-4	<u>5-11</u>	5-6	4-11	<u>4-8</u>	4-6	4-2	3-11	3-8
	2 – 2 × 6	<u>5-7</u>	5-3	<u>4-11</u>	4-7	4-1	<u>3-9</u>	3-6	3-2	2-11	2-8
	2 – 2 × 8	<u>7-1</u>	6-8	<u>6-2</u>	5-9	5-2	<u>4-11</u>	4-8	4-2	3-10	3-6
	2 – 2 × 10	<u>8-8</u>	8-2	<u>7-7</u>	7-1	6-4	<u>6-0</u>	5-9	5-4	4-10	4-6
	2 – 2 × 12	<u>10-0</u>	9-5	<u>8-9</u>	8-2	7-4	<u>7-0</u>	6-8	6-2	5-9	5-5
	3 – 2 × 6	<u>6-8</u>	6-4	<u>6-0</u>	5-8	5-1	<u>4-10</u>	4-8	4-3	3-10	3-6
	3 – 2 × 8	<u>8-10</u>	8-4	<u>7-9</u>	7-3	6-5	<u>6-2</u>	5-11	5-5	5-1	4-8



3 – 2 × 10	<u>10-10</u>	10-2	<u>9-6</u>	8-10	7-11	<u>7-6</u>	7-2	6-8	6-3	5-11
3 – 2 × 12	<u>12-7</u>	11-10	<u>11-0</u>	10-3	9-2	<u>8-9</u>	8-4	7-9	7-3	6-10

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

- a. Interpolation ~~allowed~~ permitted for conditions with zero joist cantilever length. Extrapolation not permitted. ~~is not allowed.~~
- b. Beams supporting a single span of joists with or without cantilever.
- c. Dead load = 10 psf,  $L/\Delta = 360$  at main span,  $L/\Delta = 180$  at cantilever. Snow load not assumed to be concurrent with live load.
- d. No. 2 grade, wet service factor included.
- e. Beam depth shall be equal to or greater than the depth of intersecting joist for a flush beam connection.
- f. Beam cantilevers are limited to the adjacent beam's span divided by 4.
- g. Includes incising factor.
- h. Incising factor not included.
- i. Deck joist span as shown in Figure R507.5.
- j. ~~For calculation of effective deck joist span, the actual joist span length shall be multiplied by the joist span factor in accordance with Table R507.5(5).~~

**Delete without substitution:**

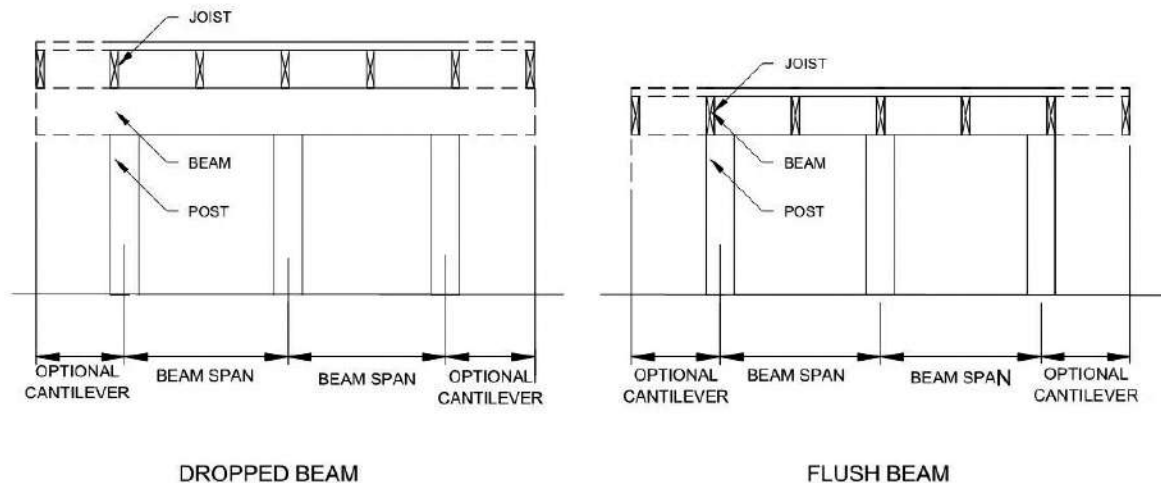
**~~TABLE R507.5(5) JOIST SPAN FACTORS FOR CALCULATING EFFECTIVE DECK JOIST SPAN [for use with Note j in Tables R507.5(1), R507.5(2), R507.5(3) and R507.5(4)]~~**

<del>G/J<sup>a</sup></del>	<del>JOIST SPAN FACTOR</del>
<del>0 (no cantilever)</del>	<del>0.66</del>
<del>1/12 (0.87)</del>	<del>0.72</del>
<del>1/10 (0.10)</del>	<del>0.80</del>
<del>1/8 (0.125)</del>	<del>0.84</del>
<del>1/6 (0.167)</del>	<del>0.90</del>
<del>1/4 (0.250)</del>	<del>1.00</del>

~~For SI: 1 foot = 304.8 mm.~~

~~a. G = actual joist cantilever length (feet); J = actual joist span length (feet).~~

**Revise as follows:**



**FIGURE R507.5 TYPICAL DECK JOIST BEAM SPANS**

**Reason Statement:** Since first appearing in the the 2015 IRC, Table R507.5 for deck beam sizing has always assumed a load from joists cantilevering their maximum amount beyond the beam. In most conditions, joists can cantilever beyond a beam up to 1/4 their back span, and this entire load is placed on the beam. This places up to 50 percent more load on the beam than a joist that does not cantilever beyond. For example, a joist that spans 12 feet with no cantilever loads the beam with 6 feet. But with an additional 3-foot cantilever, the beam is now loaded with 9 feet. Currently, Table R507.5 sizes every beam based only on the joist span, and simply includes the additional maximum cantilever loading every time. When there is no cantilever, or less than the maximum, the beam is being oversized or overly restricted in maximum span. For a 12 foot joist span with no cantilever, the beam is sized for 9 feet of joist. This is equivalent to an 18-foot joist span with no cantilever. It is woefully inaccurate to size a minimum beam for a 12-foot joist span based on loads from a 18-foot span.

In 2021 a new table was added in the footnotes of Table R507.5 that provided a factor based on the actual cantilever to joist span ratio. This factor could then be used for the input joist span value in order to generate an accurately sized beam. Though this adjustment method works, it is incredibly inconvenient and not user friendly. This proposal eliminates this footnote and its table and embeds various joist span and cantilever combinations in an expanded heading that is currently shown as only joist span. Each column that currently represent a joists span and it's maximum cantilever has been expanded to show equivalent spans and cantilever combinations. Each combination in the same column loads the beam equivalent or slightly less. Note that under the previous "effective joist span length" column for 12 feet, the new heading reveals that this column covers four different designs, an 18 foot span with no cantilever (18 & 0), a 16 foot span with a 1 foot cantilever (16 & 1), and 14 foot span with a 2 foot cantilever (14 & 2), and a 12 foot span with a 3 foot cantilever (12 & 3).

A 6 foot joist span with a 1.5 foot cantilever was the first column in the current table. In order to provide a beam size for each joist span length from 6 feet to 18 feet and with zero cantilever length, a new column was added at the left of the table.

The footnote for interpolation was modified to only permit interpolation between columns for evaluating joists with no cantilever. For example, a 13 foot joist span with no cantilever, could be easily interpolated by taking the value between the (12 & 0) and (14 & 0) columns. However, trying to interpolate a 13 foot span with a 2 foot cantilever is not quite so simply and would invite error.

To further clarify the use of the beam span table, Section R507.5 was modified to reference the joist span length and joist cantilever length and point the reader to Figure R507.6 which illustrates these terms.

Figure R507.5 for deck BEAMS is incorrectly titled "JOIST". This merely editorial, perhaps errata, perhaps mistake. Let's fix it!

**Cost Impact:** The code change proposal will decrease the cost of construction

This proposal provides three new columns of maximum beam spans within the table, which allows beams to be sized more accurately, and thus not oversized and more expensive. The current beam span table sizes beams with the assumption that the joists are fully cantilevered beyond the beam. This is 50% more loading on the beam than when there is no joist cantilever. When there is no joist cantilever or less than the maximum, the beam is oversized and more expensive. A footnote with a complicated cantilever to joist ratio table yielding a factor to adjust the input joist span for a more accurate beam size is available. However, it is very difficult to use and not convenient. Offering a way to quickly size the beam based on a few different cantilever lengths, allows a more affordable beam to be sized and purchased.